

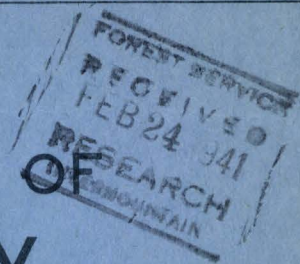
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FORESTRY POSSIBILITIES OF CARLTON COUNTY MINNESOTA

A FOREST SURVEY..
AND NEW PUBLIC DOMAIN
PROGRESS REPORT

R. N. CUNNINGHAM REGIONAL SURVEY DIRECTOR



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

LAKE STATES FOREST EXPERIMENT STATION

RAPHAEL ZON DIRECTOR
ST. PAUL MINN.

FOREWORD

This study was undertaken to provide a more substantial basis for dealing with some of the forestry problems arising in connection with county land-use planning. Probably the most pressing questions to be dealt with are:

1. What are the present timber resources of the county and what is the prospective yield in terms of volume, employment, and cash income to local people?
2. What are the possibilities of developing the tax-forfeited lands and other lands zoned out of agricultural use into revenue-producing forest properties?

The statistical material in this report has been abstracted primarily from data collected in the Forest Survey and Tax Delinquent Land projects of the Lake States Forest Experiment Station. The original Forest Survey did not provide timber estimates for individual counties. The volume and growth figures in this report were obtained by applying average per-acre figures from Survey Unit No. 1 to acreages taken from a forest type map of Carlton County. This procedure will not provide extremely dependable volume and growth figures but it is believed that the general picture presented will be found to be essentially correct.

Personnel of the following agencies have cooperated with the Station in assembling and interpreting the data: Division of Forestry, Minnesota Conservation Department; Division of Forestry, University of Minnesota; Division of Agricultural Economics, University of Minnesota; Division of Markets and Costs, Bureau of Agricultural Economics; the State Extension Service.

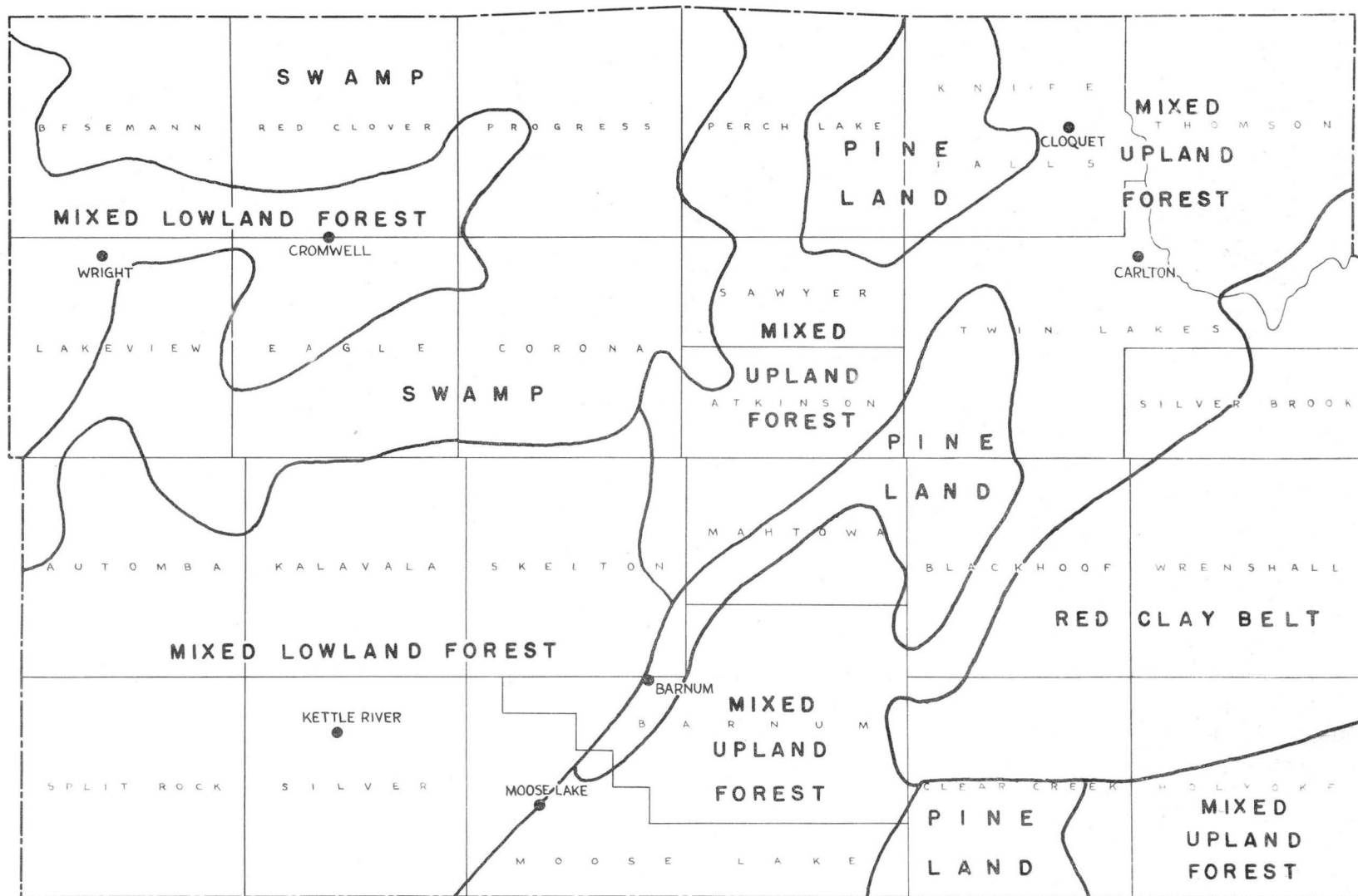
FORESTRY POSSIBILITIES IN CARLTON COUNTY

By John W. Macon, Assistant Silviculturist, H. C. Moser, Forest Economist, and R. N. Cunningham, Senior Forest Economist, Lake States Forest Experiment Station 1/



GENERAL LOCATION

1/ Maintained by the United States Department of Agriculture, Forest Service, at University Farm, St. Paul, Minnesota, in cooperation with the University of Minnesota.



MAJOR FOREST DIVISIONS IN CARLTON COUNTY

FORESTRY POSSIBILITIES IN CARLTON COUNTY 1/

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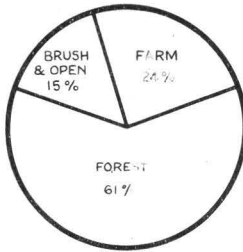
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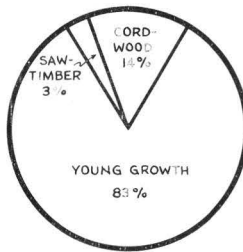
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1/ Assistance in the preparation of this material was furnished by the personnel of Work Projects Administration. Official project 665-71-3-69, Sponsor, University of Minnesota; and O.P. 101-2-71-28, Sponsor, Lake States Forest Experiment Station.

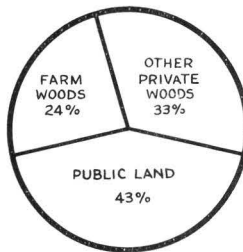
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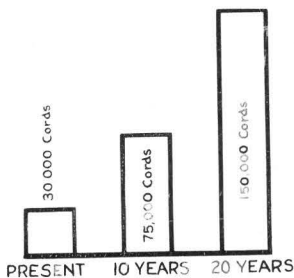
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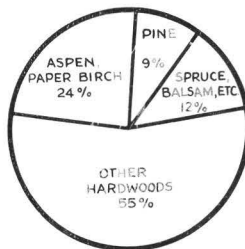
CLASSES OF TIMBER



FOREST OWNERSHIP



ALLOWABLE CUT



VOLUME BY SPECIES

1. Nearly two-thirds (61 percent) of the land in Carlton County is wooded. Another 15 percent is brush or open land.

2. The timber is mostly young. Only 3 percent of the wooded area is saw-timber forest and only 14 percent is even cordwood forest. Eighty-three percent is in the deforested or restocking stage.

3. Forty-three percent of the forest land is now publicly owned, 24 percent is in farm woods, 33 percent is in other private ownership. The bulk of the public land has been acquired through tax forfeiture and is now under county supervision. About half of the private forest land outside farms is tax delinquent and may soon be added to county holdings.

4. Because of preponderance of immature timber, cutting for the next 10 years should be very light--not more than 30,000 cords from live merchantable trees is recommended. If the rest is protected, it should yield 75,000 cords annually after 10 years and 150,000 cords or more after 20 years.

5. The principal species available are aspen and mixed hardwoods.

FOREST CONDITIONS

Carlton County is transitional between north woods and southern Minnesota farming country. About 418,000 acres, or 76 percent, of the total area is forest or brush land.

Kinds of Forest Land

From a forestry standpoint, Carlton County can be divided into five districts where soil and cover conditions are distinct and where forestry possibilities, therefore, are different.

1. Pine Lands

These areas comprise slightly less than 10 percent of the county. They are mainly sandy or stony lands suitable for red, white, or jack pine. The northern area, around Cloquet, is somewhat rough and rocky, but the southern blocks are mostly sandy and comparatively free from stones. Of the 36,000 acres of wooded or open land, only 9 percent (about 2,800 acres) is now in pine timber. Most of this pine is in farm wood lots within districts zoned as agricultural. The remaining 91 percent is covered mainly with young aspen and other inferior hardwoods. About 1,500 acres of this is open and suitable for forest planting.

2. The Red Clay Belt

This district covers about one-eighth of the county. The land is rough in many places with the streams flowing in deeply incised valleys. The red-clay district originally supported good stands of white pine, but now it is occupied almost exclusively by aspen. It is capable of producing fair to good quality aspen. Much of the area is now seriously understocked. White pine, white spruce, and balsam are doing well in a few localities where they have become established, but there is little evidence that softwoods will return naturally to this area on any large scale.

3. Mixed Upland Forest

The eastern half of the county, excluding the pine and red-clay areas described above, is an area of mixed soils in which those of medium texture and fair drainage predominate. The area covers nearly one-third of the county.

The characteristic forest cover at present is aspen and most of this is young and understocked. However, these lands have good possibilities for development. Site conditions are variable for aspen, but the better areas will produce six or eight cords of pulpwood and 12 to 14 cords of conversion wood and fuel at 40 years of age. More significant is the tendency of many of the aspen stands to evolve into better timber types. In the original forests white pine, balsam fir, spruce, sugar maple, and oaks were prominent; and many of these species are appearing again as an understory to the aspen.

With protection and proper cutting a good mixed forest will soon become established.

4. Mixed Lowland Forest

More than one-quarter of Carlton County is designated within this division. The land is characteristically poorly drained and the forest types reflect this condition. The original forest in this division contained a great deal of balsam fir, spruce, and tamarack, mixed with elm, ash, and balm of Gilead. These species are all present in the regrowth, but the proportion of softwoods is smaller. On many areas young aspen is now the only cover, while on others inferior swamp hardwood species are predominant. Site conditions vary but in general are good for swamp conifers, poor for aspen and other hardwoods. In many places the aspen has the same unhealthy and stunted appearance that it has along the prairie margin in western Minnesota.

5. Swamp

Swamps are scattered over all of Carlton County but are most concentrated in the northwest quarter, where they cover about 100,000 acres. Nearly one-third of this swampland is open bog and marsh, and is virtually nonproductive even for timber. Another third is covered with coniferous swamp, and the remaining third is primarily aspen. Much of the spruce, tamarack, and cedar swamp forest has a high potential value, but few stands are now merchantable. Some fairly good aspen and balsam is growing on the swamp borders and on islands of high land.

Greatest agricultural development has taken place in mixed upland and the mixed lowland forests; least development has occurred in the swampy northwest part of the county. The soil of the red-clay belt, while producing fair yields in some crops, is so difficult to work as to discourage farming.

	Percent of Forest Divisions in Agriculture
Pine lands.....	27
Red-clay belt.....	16
Mixed upland forest.....	31
Mixed lowland forest.....	29
Swamp.....	8
County total.....	24

The potential value of the land for agricultural expansion can be presented inversely by a comparison of the relative amounts of land restricted to further agricultural development in the various forest divisions. Ten of the 25 townships in the county have not yet been zoned, but have been tentatively classified as to agricultural value. The pine lands and the mixed lowland forest area have the least amount of land unsuited to agriculture, while considerably over half of the land within the swamp area is unfit for farming.

Percent of forest division unsuited for agriculture

Land	: Zoned as non- : agricultural at : present	: Additional area : tentatively : classified as : nonagricultural
	<u>Percent</u>	<u>Percent</u>
Pine lands.....	16	0
Red-clay belt.....	24	11
Mixed upland forest....	20	1
Mixed lowland forest...	9	5
Swamp.....	53	9
County total.....	23	5

More than a quarter of the land in the county has already reverted to the State through nonpayment of taxes. An even larger area is now tax-delinquent. The pattern of distribution of tax-reverted land resembles that of agricultural development. Least forfeiture has occurred in the better agricultural areas, and most in the poorer areas, notably in the red-clay belt and in the swamp.

	<u>Percent of Forest Divisions which are tax forfeited</u>
Pine lands.....	20
Red-clay belt.....	34
Mixed upland forest.....	19
Mixed lowland forest.....	20
Swamp.....	50
County total.....	27

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
LAKE STATES FOREST EXPERIMENT STATION



ADDRESS REPLY TO
DIRECTOR
AND REFER TO

UNIVERSITY FARM
ST. PAUL, MINNESOTA

RE-LS
FOREST SURVEY
Minnesota
(Carlton County)

February 19, 1941

TO DIRECTORS, FOREST EXPERIMENT STATIONS:

We are sending you herewith a copy of our Economic Note No. 13, "Forest Possibilities of Carlton County, Minnesota.

A very limited supply of this publication has been printed and we are, therefore, unable to send you more than one copy of it.

Very truly yours,

RAPHAEL ZON, Director

By

R. D. Cunningham
Acting

Enclosure



Table 1.--Forest area and average stand and growth of timber per acre

Forest type:	Size class	Approx- imate age	Acreage	Timber stand		Current growth	
				Total	Per acre	Total	Per acre
				Cords	Cords	Cords	Cords
Pine.....	(Sawlog	50	385	13,552	26	139	0.36
	(Cordwood	30	2,360	26,244	11	1,534	0.65
	(Reproduction	15	1,345	4,127	3	707	0.53
Conifer swamp.....	(Sawlog	120	1,830	41,057	22	443	0.24
	(Cordwood	80	3,910	36,906	9	1,774	0.45
	(Reproduction	40	37,805	58,535	1½	4,694	0.12
Mixed conifer and hardwood swamp	(Sawlog	90	2,415	42,190	17	1,067	0.44
	(Cordwood	60	20,070	147,915	7	5,613	0.28
	(Reproduction	30	7,665	21,462	3	1,333	0.17
Upland hardwood..	(Sawlog	90	4,925	72,317	15	1,082	0.22
	(Cordwood	40	9,460	77,711	8	3,497	0.37
	(Reproduction	20	8,380	19,677	2	1,160	0.14
Aspen- birch.....	(Sawlog	40	840	15,061	18	467	0.56
	(Cordwood	30	10,550	86,826	8	7,320	0.69
	(Reproduction	20	225,090	262,148	1	54,240	0.24
All forest..	(Sawlog	.....	10,395	184,177	18	3,198	0.31
	(Cordwood	.....	46,350	375,602	8	19,738	0.43
	(Reproduction	.....	281,185	365,949	1	62,134	0.22
	(Deforested	.....	80,120	.....	.....	.....	.....
Total.....			418,050	925,728	2	85,070	0.20

Timber Volume

Most of the timber in Carlton County is very young and by far the largest share is aspen and other inferior species. A number of factors have contributed to this rather run-down condition, notably: (1) poor forest soil and poor drainage in parts of the county; (2) heavy logging in the early days; (3) the Hinckley and Cloquet fires in 1894 and 1918; (4) clearing and later abandonment of sandy pine lands; and (5) current practice of clear cutting young timber.

The total present stand is estimated to be 926,000 cords as follows:

	<u>Cords</u>
Pine.....	85,000
Spruce, fir, etc.....	112,000
Aspen and paper birch.....	225,000
Other hardwoods.....	504,000
Total.....	<u>926,000</u>

Only a portion of this timber is mature and ready for cutting. In the case of the pine type, only 31 percent of the volume is in saw-timber stands. (This does not include the timber in Jay Cook Park and the Cloquet Experimental Station.) In the case of swamp conifers about 57 percent of the volume is in saw-timber or cordwood stands. Even in the hardwood forests the volume is predominantly in immature stands. Only 28 percent of the volume in the aspen type is in cordwood or saw-timber stands and only 30 percent of the miscellaneous species are in saw-timber stands.

Growth and Yields

Current growth has been estimated at 85,000 cords per year. This means an average of one-fifth of a cord per acre per year on the entire forest area. Most of this growth is on young stands not yet marketable. For this reason it is not currently realizable. The volume that can be removed annually during the next 10 years, without crippling the growing stock, is believed to be in the neighborhood of 30,000 -- mostly aspen and mixed hardwood.

If cutting (at the rate of about 30,000 cords per year) is carried on systematically in mature stands and as thinning and weeding operations, the quality and density of second-growth stands should increase measurably in the next few years and it is reasonable to believe that the annual yield can be increased to 75,000 cords by 1950 and to 150,000 cords by 1960. This latter yield would be at the rate of a little more than one-third of a cord per acre per year (table 2).

The future growth possibilities of the individual types can be stated about as follows:

Pine type.--But very little pine is sufficiently mature to cut during the next 10 years. If the annual cut is restricted to about 500 cords for this period, it can be increased ten-fold in 10 years and twenty-fold in 20 years.

Table 2.--Potential quantity of timber that can be cut from Carlton County land, if properly managed

Product	Potential annual yields		
	Now	10 years hence	20 to 30 years hence
	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>
Pine (pulp).....	500	5,000	10,000
Spruce-fir (pulp).....	500	10,000	20,000
Aspen (pulp).....	4,000	20,000	40,000
Miscellaneous cordwood.....	25,000	40,000	80,000
Total.....	30,000	75,000	150,000

The cordwood stands which average about 30 years of age are coming along well. On the average they are growing at the rate of two-thirds cord per acre per year--a fairly high rate for this north region. About all they need is to be protected for 10 or 20 years when they will become mature and ready to cut. Most of these cordwood stands are in farming districts and can produce even now some fuel wood and conversion wood from thinnings. At current stumpage rates, an acre of young jack pine with 11 cords is worth about \$6.60. If held for 10 years it should contain about 18 cords of larger stuff and be worth about \$13.50; and in 20 years should contain 24 cords worth \$21.60. In most cases it is good business to wait.

The restocking stands of jack pine are of all ages up to 22 years and are of various densities. The average age is about 15 and the average stand per acre about 3 cords. If cut now, this

will bring about \$1.50 per acre in stumpage. The average growth is about one-half cord per acre which means that the merchantable volume will more than double in the next 10 years. In 20 years it is probably safe to say that the volume will increase five-fold and the value of the stumpage (on account of larger size) will increase six-fold.

The devastated pine land is a more difficult problem. If handled as a commercial proposition, it will cost from \$10 to \$20 per acre to plant this land and something more to protect it. Probably 40 years is the shortest time in which the crop can be matured, although pulpwood in the case of jack pine can be produced at 30 years. It may be possible for the farmer to cut down the original planting cost by contributing time not needed in his farming operation. The planting stock itself should be obtainable for about \$5.00 per acre. Public agencies may also overcome the economic handicaps in planting by using relief labor.

Spruce-fir type.--During the next 10 years, cutting in conifer swamp types should be restricted to removal of scattered overmature trees and to thinnings in growth stagnant areas. This will yield about 500 cords per year. By 1950 some of the balsam stands will be ready to cut and by 1960 partial cutting of spruce may begin. Yields of 10,000 to 20,000 cords per year are believed possible.

Most of the spruce, balsam fir, tamarack, and cedar stands are considered merchantable when they reach the cordwood stage. About 87 percent of the conifer swamp forests, however, are now below cordwood size. At current stumpage rates (35 cents per cord for conversion wood, posts, and fuel) these young stands, with $1\frac{1}{2}$ cords per acre, would yield about 50 cents per acre if cut now. The current growth, although slow will about treble the present volume in 25 years and in so doing will probably increase the value five- or six-fold since a large proportion of volume will then be suitable for standard pulpwood worth \$1.50 per cord on the stump.

A certain proportion of the swamp forest (probably about 30 percent) is of the stagnant and nonproductive type. Even when mature, the trees are only 3 to 6 inches in diameter. It is appropriate to utilize such of this material as is marketable for conversion wood, Christmas trees, etc., as long as current drain does not exceed current growth.

Aspen type.--Ninety-five percent of the aspen forest is below cordwood size, and much of this is understocked. The merchantable volume in the young stands ranges from 0 to 3 cords per acre and the current growth from one-tenth to seven-tenths cord. The average volume is 1 cord and the average growth one-fourth cord.

As in the case of pine and spruce, the thrifty young aspen stands (some of which are growing as much as one-half to two-thirds cord per acre) should be allowed to grow at least 10 to 20 years before they are cut.

In these thrifty stands, aspen is one of the fastest growing species in the Lake States and the rate of growth may be expected to increase as the trees approach merchantable size. On fair to good sites 30-year-old cordwood stands may add as much as one cord per acre per year for 15 or 20 years. The acceleration in current growth rate is accompanied by a substantial improvement in the quality of the material which can be cut from the individual trees. For example, only one-quarter of the volume of a 6-inch diameter tree is suitable for standard pulpwood, while three-quarters of the volume of 8- and 10-inch trees can be utilized.

Except on the best sites, however, heart rot may be responsible for considerable cull in an aspen stand which is left uncut after it is 50 years of age. On an average site the cull due to decay will be 8 percent in a 40-year-old stand and 16 percent in a 60-year-old stand. In general this deterioration will commence at a later age in better stands and at an earlier age in poorer stands. The cull will be greatest in aspen stands on the sandy pine land and lowest on the better hardwood land, with the cull on spruce-balsam land between these two extremes.

Many stands of aspen go to pieces while they are still in the small cordwood stage, or in extreme cases even before they reach merchantable size. This condition may be caused by poor site, by sapping of the vitality of the aspen stock, by repeated fires, and possibly by excessive competition of sprouts. Usually certain symptoms, notably dark, rough bark, poor form, and flat tops, are evident a few years before disease has made serious inroads into the stand. Areas which show this tendency might as well be cut whenever there is a demand for the kind of material they will produce.

In many cases the aspen stands have a scattered understory of balsam fir, pine, or valuable hardwoods. In utilizing the inferior popple, care should be taken not to destroy this understory.

Local Wood Requirements

About 163,000 cords of wood are consumed annually in Carlton County (table 3). However, only 55,000 cords are obtained from Carlton County itself. The rest is brought in from St. Louis, Itasca, Crow Wing, and other nearby counties.

The present cut is less than the current growth, but it is more than should be cut under good forest management. Under management, the cut of pine, spruce, and balsam would have to be

Table 3.--Estimated annual consumption and loss of wood in Carlton County

Use	Total	Pine	Spruce and balsam	Tama- rack and cedar	Maple, bass- wood, birch	Elm, ash, etc.	Oak	Aspen and paper birch
	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>
Used by pulp mills ^{1/}	113,200	39,000	44,200	.....	.....	.....	.....	30,000
Used by match factory ^{2/}	9,900	.....	.....	.....	.....	.....	.....	9,900
Used by sawmills....	3,300	1,200	300	.....	400	200	200	1,000
Hewed for ties.....	1,200	300	.....	200	.....	600	100	.....
Poles and posts.....	2,100	100	100	1,600	.....	100	.....	200
Cut for mine timbers	2,500	1,900	100	500	.....	.....	.....	.....
Cut for fuel wood...	11,400	400	300	200	900	3,300	300	6,000
Cut for miscel- laneous uses....	1,000	500	100	200	100	.....	.....	100
Fire and other losses.....	18,300	1,900	3,600	1,100	1,200	3,700	.....	6,800
Total ^{3/}	162,900	45,300	48,700	3,800	2,600	7,900	600	54,000

^{1/} Only 12 percent of the wood used in pulp mills comes from Carlton County. This county produces 18 percent of the aspen, 14 percent of the spruce and balsam, but only 3 percent of the jack pine used in the Cloquet pulp industries.

^{2/} Only about 25 percent of the match and clothespin bolts are cut in Carlton County. Thirty-five percent of the aspen but only 9 percent of the birch is produced in the county.

^{3/} Excluding the pulpwood and match bolts brought in from the adjacent counties, the total would be 55,000 cords, made up of 7,500 pine, 11,000 spruce and balsam, 3,800 tamarack and cedar, 7,500 elm, ash, etc., 22,000 aspen, and 3,200 cords of other hardwoods.

very greatly reduced for 10 or 15 years and even in aspen the immediate yield of high-grade pulpwood would be very limited. The cut of low-grade aspen, dead and defective tamarack and cedar, and miscellaneous hardwoods, could be maintained or even increased in many areas if the wood could be profitably used or marketed.

The market for wood is unusually good in Carlton County. The large pulp mill at Cloquet uses pulpwood bolts of jack pine, spruce, balsam fir, and aspen down to 4- to 5-inch diameter. The wood-conversion plant uses aspen down to 4 inches and softwood species down to 2-1/2- to 3-inch diameter. The match and clothespin factory offers a market for higher quality aspen and paper birch. Some half dozen small sawmills use both hardwood and softwood trees of slightly larger than pulpwood size. The Mesabi Iron Range, 60 miles to the north, offers a market for ties, mine timbers, poles, and lagging. Local farms and villages use large quantities of firewood, posts, and poles. Dwindling timber supplies in adjacent states are creating a growing export market, particularly for pulpwood and ties. Table 3 shows the approximate volume of wood consumed in an average year.

Ownership of Forests

The approximate ownership of woods and deforested brushland is as follows:

	<u>Acres</u>
State.....	17,000
Federal (Indian).....	12,000
County.....	150,000
Farm woods.....	102,000
Other private.....	<u>137,000</u>
Total.....	418,000

State Forest Land

About 4,000 acres of the State land is in Jay Cook Park where it is dedicated to recreational use.

About 3,000 acres is included in the Cloquet Experimental Forest managed by the University of Minnesota. This is relatively productive forest land and can be expected to contribute a steady flow of forest products.

The other 10,000 acres are scattered parcels (mostly Sections 16 and 36). About 7,000 acres are included in two State forests where they constitute 5 percent of the total area of the designated units. These State lands are being protected and managed by the State Rangers at Moose Lake and Cloquet. They are in somewhat better condition than surrounding private lands, but contain only small quantities of timber merchantable at this time.

Federal (Indian) Forest Land

About 7,000 of the total 12,000 acres of Indian lands are inside the Fond du Lac State Forest. The remainder are in adjoining townships. These are administered by agents of the Office of Indian Affairs. So far as is known they do not contain any appreciable quantity of marketable timber.

"County" Forest

About 150,000 acres of forest or potential forest have reverted or are in the process of reverting to public ownership by tax forfeiture. Under present laws, the title to these lands passes to the State of Minnesota but actual jurisdiction is assigned to the counties. For practical purposes, therefore, these are county forest lands.^{1/}

About 40 percent of the "county" lands are within units designated as State Forests.

A little less than two-thirds of the "county" land is in areas definitely zoned against agriculture. Most of the remaining third is in more or less concentrated blocks somewhat removed from roads and adjoining settlement but a portion of it is intermingled with farm land.

^{1/} Further particulars on legal basis for handling tax-forfeited lands are given in the appendix.

It is likely that some portions of the county holdings will be deemed suitable for private ownership and will be returned to the tax roll through sales. On the other hand, the county holdings will soon be enlarged through additional foreclosures and it will not be surprising if the acreage of county holdings will be swelled to 200,000 acres or more within the next few years.

The county forest lands are believed to be slightly inferior to the private and state lands, with respect to merchantable timber. They contain relatively little pine and most of the spruce, tamarack, and cedar is below marketable size. There is, however, a great deal of aspen and swamp hardwood which will be merchantable within 10 to 15 years; and even now a certain amount of fuel wood, posts, non-version wood, etc. could be salvaged without harm to the forest. At the present time about 11,000 cords per year could be cut, and at least 33,000 cords should be ready to use 10 years hence if the lands are protected and proper cutting methods are used. (Table 4.)

Farm Woods

About 102,000 acres of woods are in farms which means that the average farm has a little less than 40 acres of woodland. There are some currently productive farm woodlands notably in the pine land adjacent to Barnum and occasionally in the spruce swamps. The typical farm woods, however, is a patch of immature timber of inferior species.

Table 4.--Potential quantity of timber that can be cut from tax-forfeited lands and other lands zoned against agricultural settlement, by townships

Township	Potential annual yields									
	Now					10 years hence				
	Pine	Spruce balsam	Aspen	Fuel	Total	Pine	Spruce balsam	Aspen	Fuel	Total
	Cords	Cords	Cords	Cords	Cords	Cords	Cords	Cords	Cords	Cords
Atkinson....	100	100	°	°	50	150	200
Blackhoof...	150	350	500	50	150	400	700	1,300
Knife Falls.	°	°	50	150	200	.....	100	150	250	500
Mahtow.....	°	°	50	150	200	50	150	150	250	600
Silver Brook	50	150	200	.....	50	150	200	400
Thompson....	100	100	.....	.....	50	150	200
Twin Lakes..	°	°	100	400	500	100	100	300	500	1,000
Besemann....	°	150	450	600	50	350	500	800	1,700
Corona.....	°	150	350	500	50	300	400	650	1,400
Eagle.....	°	100	200	300	50	250	200	500	1,000
Lakeview....	°	150	450	600	50	300	450	1,000	1,800
Perch Lake..	°	50	150	400	600	50	500	300	1,450	2,300
Progress....	°	50	150	500	700	50	350	300	1,000	1,700
Red Clover..	°	°	150	350	500	50	200	450	900	1,600
Sawyer.....	°	°	50	150	200	50	100	150	300	600
Automba.....	°	50	350	400	.....	100	250	650	1,000
Kalavala....	°	50	250	300	.....	100	200	400	700
Silver.....	50	150	200	.....	50	200	250	500
Skelton.....	100	500	600	.....	200	300	1,200	1,700
Split Rock..	150	350	500	.....	250	350	700	1,300
Barnum.....	°	°	100	300	400	50	200	300	650	1,200
Clear Creek.	°	°	200	600	800	250	400	900	1,350	2,900
Holvoke.....	°	150	450	600	150	500	1,000	1,350	3,000
Moose Lake..	°	100	200	300	50	100	250	500	900
Wrenshall...	°	°	400	700	1,100	150	300	1,250	1,800	3,500
County....	100	2,800	8,100	11,000	1,250	5,100	9,000	17,650	33,000

°Limited salvage of overmature and decadent trees possibility.

Probably no more than 5 percent of the farmers in Carlton County produce timber for cash sale and probably less than half of these are getting the wood from their own lands. On the other hand, the majority of Carlton County farmers burn fuel wood and most have need for posts, poles, and lumber. In many parts of the county, they are having difficulty in getting even fuel wood from their own lands.

In the end, 40 acres of woodland may be able to produce the wood needed by the average farm, but to remove 15 or 20 cords per year from the present understocked and immature stands amounts to forest destruction. The farmers who need this much wood should acquire additional land or should seek access to stumpage from publicly owned land until their own holdings get in better shape.

Other Private Lands

The 137,000 acres of private lands outside of farms are probably slightly but not strikingly better than the tax-forfeited land now held by the public. As a matter of fact, taxes are now delinquent on nearly half of the land and much of this will probably revert in the near future. No attempt has been made to analyze the possibilities of this land for future colonization or for private forestry. Some additional settlement is undoubtedly possible, particularly in districts where new roads are being built and with some adjustment in taxes, commercial holding for timber production is conceivable. This, however, is a problem for later consideration.

POSSIBILITIES IN MANAGING COUNTY FOREST LANDS

Insofar as immediate land-use planning is concerned, the big problem is what to do with the forest and wild lands reverting to public ownership for nonpayment of taxes. The three principal questions are: What sort of treatment do they need? What will it cost? How much income can be expected to offset costs?

Kind of Management Needed

The management requirements for these lands are simple. The essential needs are protection from fire, protection from trespass, and timber-sale policy that will prevent destroying immature timber.

Protection from Fire

The State Conservation Department has a system of lookouts, telephone lines, patrolmen, etc., covering the entire county. It receives help from the Federal Government in the form of a Clarke-McNary allotment of about three-fourths cent per acre and use of CCC boys. County law enforcement officers are cooperating with the State in preventing man-caused fires. While this system may need strengthening from time to time, no major alterations seem necessary.

Protection from Trespass

To fully take care of the public interest, the county should have an agent in practically every township in which there is 5,000 acres or more of public land. These agents would not need to be paid employees in most cases, but would be responsible local citizens who would be willing to keep an eye on the county lands.

The county can doubtless enlist the help of the State Rangers, town supervisors, and in some areas retired farmers who are receiving old-age assistance.

The trespass problem will be greatly simplified when a simple timber-sale procedure is worked out. If farmers can get permits for dead and down timber at a nominal fee and can buy pulpwood stumpage at 50 cents to \$1.00 per cord, without any red tape, there will be less trespass.

Timber Sale Policy

A definite plan is needed for selling mature and defective timber, thus getting some cash revenue from forfeited lands, while building up the resources for greater future yields. The bulk of the county lands need a period of 10 to 20 years to recuperate before they can support regular commercial timber sales. In the meantime, however, they can provide some revenue through sale of dead and defective timber for fuel, posts, etc., and from rental of pastures and other special uses. This will necessitate:

(a) Designation of tracts to be handled for conservation purposes. Presumably this will include all forfeited lands within the "restricted" zones as recommended by the townships, plus any other undeveloped tracts not needed immediately for agriculture, providing these lands have prospect of yielding hay or timber stumpage for a period of years.

(b) Drawing up cutting rules--low-stump and close-top utilization, trees below certain diameter not to be cut, conifer slash to be properly taken care of, skid roads in swamps to be at least so far apart, etc.

(c) Simple sale procedure for small sales. This may require changing the State law, which calls for detailed appraisals and sale at public auction.

(d) Supervision of cutting. Within State forests and possibly some adjoining areas, the County Board can possibly work out a cooperative arrangement with the Conservation Department whereby State men, as agents of the county, will handle timber sales. At present, the State has only a few timber appraisers in northern Minnesota -- not enough to properly handle sales on trust-fund lands. To be able to help the county, therefore, the Conservation Department will need appropriations for more personnel.

(e) Scaling the timber cut. Few appraisers can estimate the volume of sound timber that will come off of a tract within 25 percent. Most errors are underestimates, for which there is no redress. Overestimates frequently are adjusted by giving the purchaser additional stumpage elsewhere. Thus, the county stands to lose consistently on sales on appraisal only. Good business dictates selling on actual scale (with certain allowable short cuts for products of low value). The county can probably make this a requirement immediately insofar as it is able to handle the scaling with its own personnel, or with volunteer agents.

Emergency Conservation Work

Since the State has legal title to the forfeited lands and the county, by designating tracts as "conservation" areas, is authorized to remove them from sale and agricultural development,

it would seem that the county would have a case for getting cooperation from the CCC and WPA. This question should be clarified. A number of possibilities for work by these agencies exist on the "county" forest lands, notably:

- (a) Intensified protection--fire towers, trails, telephone lines.
- (b) To improve utilization--low standard roads.
- (c) Reforestation--sand plains in Clear Creek township, for instance. The State has a tree nursery near Willow River.

Cost of Management

The additional cost to the county of the above measures should not be great. It would probably include yearlong salary of a Land Commissioner, a few hundred dollars per diem for agents in the townships and for County Board members, a few hundred dollars for travel, supplies, and clerical help. Probably \$3,000 would make a good start. Part, if not all, of this expense would be covered by receipts in the "forfeited tax-sale fund."

Possible Revenue

At present the county gets practically nothing in the way of current income from the 150,000 acres of tax-forfeited land. Presumably some timber is being cut but without machinery for handling small sales no revenue flows to the county treasury.

Under administration, it is estimated that 11,000 cords per year could be cut from these lands and within 10 years this cut could be increased to 33,000 cords. Even allowing for a poor market for the aspen and miscellaneous hardwoods which make up the bulk of current yields, it is reasonable to expect that several thousand dollars could be taken in annually. Approximate yields are shown by townships in table 4.

Immediate cash revenue, however, should not be the primary consideration. If these lands are properly managed, future yields will be greater and the county will benefit not only from direct revenue but also from increased industrial activity. The 1930 Census listed 1,733 men engaged in forestry, saw and planing mills, paper and other wood-using industries in Carlton County. This was 26 percent of all those gainfully employed. The number is probably somewhat smaller at present but the 162,900 cords of wood consumed within the county probably provide 268,000 man-days work in the mills and 43,000 man-days in the woods. This means approximately yearlong work for nearly 1,000 men and part time (2 to 4 months) for about 250, plus odd-time jobs for others cutting posts, firewood, etc. The future prosperity of the cities, villages, and farms in this area depends to a considerable extent upon the maintenance and expansion of these forest industries.

What To Do With Scattered Tracts

In the course of examining the timberlands, several settlers were interviewed as to their own interest and the interest of their neighbors in cutting stumpage from public lands. In four townships in the northwest corner of the county, the interviewers were given the names of some 32 settlers who had the time, inclination, and equipment to cut wood during the winter months. Many others were interested in getting access to timber for fuel wood and posts. One or two spoke of a desire to acquire special tracts of woodland for their own use, if taxes are not too high. Most of these settlers had 4 or 5 months during the winter when farm work was not pressing and would be glad to put in 4 to 6 hours a day at woods work.

This local demand for jobs and for fuel wood doubtless can be met in large part by a constructive policy for managing the major blocks of county land--making small timber sales to local settlers. Another possibility also seems worthy of consideration, that is, the actual assignment of specific tracts of land to individual settlers by lease or sale. In practically every township there is some tax-forfeited forest land in blocks of 40 to several hundred acres that is intermingled with or adjacent to developed farming communities. These scattered parcels are rather hard to administer as public forests. Why not rent some of these tracts

to nearby settlers at 5 to 10 cents per acre, plus stumpage on commercial products cut, with the understanding that the renter will protect the land from fire and trespass and will cut only certain sizes and kinds of timber. The settlers will use the land as a source of fuel and later as a place to work part-time cutting pulp and other commercial products. Eventually they may want to buy these lands outright and add them to their farms.

CONCLUSIONS

1. The forest lands which have reverted to public ownership for nonpayment of taxes are primarily nonagricultural. The problem is how to make these into a county asset rather than a liability.

2. In spite of their run-down condition, many of these lands can be developed into productive forests within 10 to 20 years. A good local market for cordwood products simplifies the problem.

3. Most of the lands are roughly consolidated and can be dealt with as State, county, or township forests. Under existing laws the simplest initial step probably is to set them up as county forests. If it appears desirable to transfer part to the State or to the townships later, nothing will be lost.

4. It is proposed that the county employ a Land Commissioner to look after the lands in question. This man should be selected with the help of the State Forester but would be accountable to the ^{County} Auditor. He will need some assistance and some travel expense. Hence an annual budget of \$3,000 is suggested. The primary job will be to arrange local cooperation in protection from trespass and to create a system of small timber sales to local people.

5. Consideration may be given to a plan of selling or leasing scattered parcels of forfeited land intermingled with or adjacent to farming communities to responsible settlers who will use the lands as a source of fuel and a place to work during the winter when farm work is slack.

APPENDIX

Legal Basis for Handling Tax Forfeited Forest Land (Chap. 278, Laws of 1935 and Chap. 328, Laws of 1939)

After 5-year delinquency, lands forfeit to the State, but all net income is payable to taxing units having an equity in delinquent taxes. Equities in Carlton County average about 12 percent State, 22 percent County, 22 percent township, and 44 percent school districts.

Chief responsibility for custody, sales, lease, etc., rests with the County Board. The following procedures are outlined by the Law of 1939:

1. Board to classify lands as "conservation" or non-conservation." This classification must be approved by the township boards. May be altered from time to time. The State has no voice in this classification.

2. Lands classified as "conservation" cannot be sold (except to government subdivision), but timber, hay, etc., can be sold or the land may be leased by the County Auditor. The stumpage must be appraised and offered at auction. If not sold then it may be sold later at private sale at appraised value. These sales are made for cash in advance. The appraisal (estimated value of the stumpage) and the forestry practices to be followed must be approved by the State. The Conservation Commissioner also designates the areas from which timber is to be cut.

3. Lands classified as "non-conservation" may be sold at auction for cash or on terms. It must be appraised by the County Board and, if it contains merchantable timber, the timber is to be appraised separately. The State must approve the stumpage appraisal but otherwise is not involved in the transaction. The County is authorized to lease lands for one-year periods and can sell stumpage (retaining the land) from areas designated by the Conservation Commissioner.

4. Income from sale of lands and stumpage is payable into a "Forfeited Tax Sale Fund." Before apportionment to taxing units, a number of expenditures are authorized, the most important being (a) salary and expenses of a "Land Commissioner" to assist the Auditor and Board, (b) clerical help for County Auditor and part of Auditor's salary, and (c) \$3.00 per diem for County Board members.

5. The county Board may resolve to use any or all "conservation" lands for conservation use and may request the cooperation of the Conservation Commissioner in development and management of such lands.

Average cost per acre of planting on National Forests

State	Nursery production	Ground preparation	Field planting	Total
	Dollars	Dollars	Dollars	Dollars
Michigan.....	1.61	3.66	3.68	8.95
Minnesota....	3.78	5.29	7.90	16.97
Wisconsin....	1.51	5.29	3.49	10.29
Region 9.....	2.06	4.31	4.34	10.71

Typical stumpage values in northeastern Minnesota

Species	Saw timber (M bd. ft.)	Pulpwood: (rough : cord)	Tie bolts (piece)
	Dollars	Dollars	Dollars
White and red pine.....	5.00 - 8.00	0.75	.....
Jack pine.....	2.50 - 4.00	.75	.....
Spruce.....	2.50 - 4.00	1.50	.....
Balsam.....	2.50 - 3.00	.75	.....
Tamarack.....	1.50 - 2.00	.....	.....
Cedar.....	1.50 - 2.00	.....	0.09
Basswood.....	2.50 - 4.00	.....	.....
Birch and maple.....	1.50 - 4.00	.....	0.09
Aspen and miscellaneous	1.00 - 4.00	.50	.....
Poles 20' and longer	1¢ per lineal foot		
Fence posts	1¢ each		
Fuel wood	\$0.25 per cord		
Christmas trees 5' - 8'	.05 each		
8' -10'	.10 each		
10+'	.01 per lineal foot		

Jack Pine Yield Table

Age	: Merchant- : able : volume	Approximate value <u>1/</u>		Mean annual growth		Periodic annual growth	
		Per cord	Total	Cords	Value	Cords	Value
		<u>Cords</u>	<u>Dollars</u>	<u>Dollars</u>	<u>Dollars</u>		<u>Dollars</u>
10	.....	.....	.....	0	0.00)	.70	0.35
20	7	.50	3.50	.35	.17)	.80	.55
30	15	.60	9.00	.50	.30)	.70	.75
40	22	.75	16.50	.55	.41)	.50	.78
50	27	.90	24.30	.54	.49)	.30	.57
60	30	1.00	30.00	.50	.50)		

1/ At 20 to 30 years mostly fuel wood and conversion wood.

At 40 years mostly pulpwood at 75 cents per cord.

At 50 years about one-third is saw timber worth \$3.00 per thousand.

At 60 years about one-sixth is saw timber at \$4.00, one-sixth at \$3.00 per thousand.

Yield Table for Aspen

(On spruce-balsam land.)

Age	Volume and approximate value ^{1/}			Mean annual growth from beginning		Periodic annual growth by decades	
	Cords per acre	Average value per cord	Total value	In cords	In value	In cords	In value
		<u>Dollars</u>	<u>Dollars</u>		<u>Dollars</u>		<u>Dollars</u>
0	0	0.00	0.00	.00	0.00)		
10	0	0.00	0.00	.00	0.00)	.10	0.02
20	2	.18	.36	.10	.02)		
30	9	.21	1.89	.30	.06	.70	.15
40	20	.22	4.40	.50	.11	1.10	.25
50	30	.28	8.40	.60	.17	1.00	.40
60	38	.36	13.68	.63	.23	.80	.53
70	42	.42	17.64	.60	.25	.40	.40
80	43	.42	18.06	.54	.23	.10	.04

^{1/} Values based upon \$1.00 per cord for sawlog and match bolts. Fifty cents per cord for pulpwood; 15 cents per cord for other material.

Products at various ages--Aspen on spruce-balsam land

Age	Approximate percentage			Average value per cord
	Sawlogs	Pulpwood	Other	
	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Dollars</u>
20	.....	10	90	0.18
30	.....	15	85	.21
40	.....	20	80	.22
50	5	25	70	.28
60	15	25	60	.36
70	25	15	60	.42
80	30	5	65	.42